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Some Recent Fern Literature

Professor F. K. Butters, of the University of Minnesota, has recently published¹ a thorough-going taxonomic study of the American lady-ferns. In distinguishing species, he has placed little weight on details of the form and cutting of the frond, taken by themselves, but has sought more reliable characters in indusia, scales, spores and the like. His conclusions may be summarized as follows:

1. The genus *Athyrium* is abundantly distinct from *Asplenium*, with which it has been, until recent years, united by American authors, but, as already pointed out by Milde and Copeland, is closely related to, and not very clearly separable from, the tropical genus *Diplazium*. It is also closely related to the more primitive species of *Dryopteris*, and probably arose from some form similar to *D. Thelypteris*.

2. The silvery and narrow-leaved spleenworts, which have been more or less handed back and forth between *Asplenium* and *Athyrium* in recent manuals, really belong in neither, but should find a resting-place in *Diplazium*.

3. The lady-fern of the Northwest, *Athyrium cyclosorum* Rupr., is identical in all essential respects with the original *A. Filix-femina* of Europe and should bear that name. The eastern lady-ferns fall into two species, distinct from each other and from true *A. Filix-femina*. For the benefit of our readers who may be interested and who may not have access to Prof. Butters's paper, the names and ranges of the three American species and a synopsis of their characters, as worked out by him, are given below.

¹ Butters, Frederic K. Taxonomic and Geographic Studies in North American Ferns. I. The Genus *Athyrium* and the North American Ferns allied to *Athyrium Filix-femina*. II. *Botrychium virginianum* and its American varieties. *Rhodora* 19: 170-216, figs. 1-5, pl. 123. Sept., 1917.

Rootstock erect or ascending, the young growth surrounded by the bases of the old fronds; stipes usually $\frac{1}{4}$ to $\frac{1}{3}$ as long as the frond, rather densely scaly near the base, the scales usually pale brown, their cells readily visible under a handlens, about 6 times as long as broad; frond widest in the middle, tapering about equally both ways; well-developed indusia usually less than 1 mm. long and proportionally broad, ciliate with long, multicellular cilia; spores yellowish and sparsely papillate. Alaska to New Mexico and California. Two varieties.

Athyrium Filix-femina (L.) Roth.

Rootstock horizontal or somewhat oblique, the young growth at the end, in advance of the bases of the old fronds; stipes proportionally longer; well-developed indusia usually 1 mm. or more in length, proportionally narrower.

Rootstock oblique, densely covered with the bases of the old fronds, stipes up to $\frac{1}{2}$ as long as the fronds, their scales usually dark brown, with cells 15 times as long as broad, not visible under a hand-lens; indusia (averaging 1.1×0.5 mm.) toothed on the margin or with a few short, one-celled or rarely multicellular cilia; spores yellowish, smooth or sparsely papillate.—Labrador to Manitoba, southward to southern New England, Pennsylvania, northern Missouri and the Black Hills. Probably also in eastern Asia. Six varieties and forms.

Athyrium angustum (Willd.) Presl.

Rootstock creeping, not densely covered with the bases of the old fronds; stipes about as long as the fronds, their scales similar to those of *A. Filix-femina*, but usually few; frond widest near the base; indusia (averaging 1.3×0.45 mm.) glandular-ciliate; spores blackish, reticulate or wrinkled.—Florida to Texas, north to Missouri, Indiana, Ohio and along the Atlantic coast to eastern Massachusetts. One variety.

Athyrium asplenoides (Michx.) Desv.

Professor Butters's treatment of this complicated group seems to the present reviewer altogether workmanlike and convincing, the more so because the ranges of his three species fall into agreement with what are coming to be recognized as laws of plant distribution. The plant of Europe, skipping eastern North America and re-appearing in the Northwest; the plant of north-

eastern America, unknown in Europe but appearing in eastern Asia; the plant known only from the coastal region of the eastern United States and portions of the Mississippi basin, are already old friends to students of plant geography. Moreover, the two eastern species were described long ago and have been very generally considered by European botanists and fern-growers as distinct from the European lady-fern; only in their own country have they been without honor. All three species will have their difficulties for the beginner, since the really crucial characters by which they are distinguished are microscopic; but there are enough obvious differences in rootstock, outline of frond and length of stipe to make them recognizable, after a little study, to the amateur, unarmed with a compound microscope. All three vary considerably and along essentially parallel lines in the shape and cutting of pinnae and pinnules; such differences cannot be depended upon in naming specimens.

In a similar study of *Botrychium virginianum*, Professor Butters distinguishes seven geographic varieties of that species, characterized chiefly by the size, color and manner of dehiscence of the sporangia.

"Fern Notes," by Mr. O. A. Farwell,¹ presents, the author tells us, the results of several years' researches in field, herbarium and library. They will be of the more interest and stimulus to fern students, because Mr. Farwell has his own point of view and, both in his use of names and in classification, is inclined to depart from the usage familiar to us in current manuals. For instance, he reduces *Lycopodium sabinaefolium*, *L. tristachyum*, *L. alpinum* and *L. sitchense* all to varieties

¹ Farwell, Oliver Atkins. Fern Notes. Ann. Rep. Mich. Acad. Sci. 18: 78-94. fig. 13. 1917.

of *L. complanatum*, maintaining that they differ from it no more than *L. obscurum* and its variety *dendroideum* from each other, and by similar characters. In matters nomenclatorial, he makes a further assault on the unfortunate name *Dryopteris*. Nieuwland has already pointed out that this name is antedated by *Thelypteris* of Schmidel (1762). Mr. Farwell goes still further back and takes up *Filix* of Hill. His reason is that Hill in his "Family Herbal," published in 1755, uses the "binomials" *Filix Mas* and *Filix Foemina* as the captions of paragraphs descriptive of the male fern and the bracken, the former coming first. The point is technical; but to the present writer's mind there is no doubt that Hill's use of this name, without generic description of his own or reference to another, utterly fails to fulfill the conditions of valid publication laid down in the Vienna Rules and that, under these rules, at least, the correct name for the genus is *Thelypteris*. In view, however, of the hundreds of new combinations required, and the many changes of name the genus has already suffered, no one has shown himself very eager to take it up, though Dr. Rydberg has made a beginning in that direction.

Other points of interest in Mr. Farwell's paper are as follows: He suggests that, since *Asplenium pinna-tifidum* occasionally produces fronds with lanceolate, acute lobes of various lengths similar to those of *A. ebenoides*, it may also be a hybrid of the walking fern and the ebony spleenwort, verging toward the former parent as *A. ebenoides* toward the latter. He gives an enumeration of varieties of the lady fern occurring in Michigan, to which, however (since Mr. Farwell wrote before Prof. Butters's paper, noticed above, appeared) names are given which were originally applied to forms of the European lady fern and are therefore not applicable to the American plant; rather extensive notes on *Botrychium* and *Ophioglossum*; and descriptions

of a new variety of *Botrychium multifidum* (*B. ternatum* or *B. silaifolium* of the manuals) and one of *Lycopodium obscurum*.

Vaughan McCaughey has contributed to *Torreyia* an interesting account of the genus *Gleichenia* in the Hawaiian Islands.² There are only four Hawaiian species, but they are important because they are the most abundant ferns of the archipelago and because one of them, *G. dichotoma*, is, so to say, a forest weed. It takes possession of clearings in the mountain woods, driving out all other vegetation and forming dense and impenetrable thickets 2 to 8 ft. high and often hundreds of square rods in extent. Its fronds grow to be 20 ft. or more in length and owing to their habit of branching repeatedly, become intertwined with neighboring fronds, forming dense, interlocked masses, garnished with the hard, sharp and thorn-like bases of old branches broken off—a formidable obstacle to the mountaineer, and a menace to the economic value of the forest.

Uluhi, as the Hawaiians call this fern, has no present usefulness. Cattle and goats will eat its fresh foliage if they can get nothing better; and Mr. McCaughey suggests that its elastic stems might be used in basket-work: otherwise this black sheep in the mostly pleasing and harmless family of ferns seems to have no redeeming features.

Mr. Maxon, continuing his studies on *Notholaena* and related genera, has published some notes on western species of Pellaea.³ In these he points out that the

² McCaughey, Vaughan. The genus *Gleichenia* (Dicranopteris) in the Hawaiian Islands. *Torreyia* 18: 41-52. March, 1918.

³ Maxon, W. R. Notes on western species of Pellaea. *Proc. Biol. Soc. Wash.* 30: 179-184. Dec., 1917.

name *Pellaea mucronata* D. C. Eaton properly applies to the fern long known as *P. ornithopus* Hook., and that *P. Wrightiana*, as it has generally been understood in recent years, really includes three species, true *P. Wrightiana*, a second long ago described by Hooker as *P. longimucronata* and a third, likewise already described by Davenport as a variety of *P. Wrightiana*, (though it is much more closely related to *P. mucronata*) and now raised to specific rank as *P. compacta* (Davenp.) Maxon.

Some, at least, of our readers will remember Dr. W. N. Steil as the discoverer of apogamy in the purple cliff-brake. He has been for some six years carrying on further studies of apogamy in various ferns and now has published some of the results.⁴ He has found several new cases of apogamy in the genera *Pellaea*, *Pteris* and *Aspidium* (used by him in the Eatonian sense to include *Dryopteris*, *Tectaria* and *Polystichum*) and concludes that it is a rather common phenomenon in these genera and a constant one in some species. He describes the manner in which embryo plants are produced without fertilization. Antheridia are usually developed on apogamous prothallia and give rise to sperm-cells apparently normal and capable of functioning. Archegonia are much more rarely produced. In a few cases the same prothallium produced two embryos, one apogamously, the other apparently as the result of fertilization.

One of Dr. Steil's most interesting experiments was the attempt to induce apogamy in the royal fern, a normally non-apogamous species, by preventing fertilization for a year and a half. The attempt entirely

⁴ Steil, W. N. Studies of some new cases of apogamy in ferns. Bull. Torr. Bot. Club 45: 93-108. pls. 4 and 5. March, 1918.

failed. The occurrence of apogamy appears to be not at all dependent on external conditions (cultural, at least), but an inherent trait.

C. A. W.

Notes and News

FERNS OF THE OSAGE NATION, OKLAHOMA.—The Osage Nation or Osage County occupies a large part of north central Oklahoma, extending from the Kansas State line south to the Arkansas River. So far as the writer is aware, little has been published on the ferns of this or other parts of the state and it is believed that a few brief notes on the ferns of the region will prove of interest.

Woodsia obtusa, *Pellaea atropurpurea*, and *Asplenium platyneuron*, are the most abundant species and are common everywhere on sandstone, the prevailing type of rock in the eastern part of the county. *Cheilanthes lanosa*, *Filix fragilis*, *Dryopteris marginalis*, *Asplenium trichomanes*, and *Selaginella rupestris* can usually be found also where sandstone outcrops.

On the limestone ledges *Notholaena dealbata* and *Pellaea atropurpurea* are everywhere abundant. *Pellaea glabella* was found at a number of places in Osage County, also in Pawnee and Kay counties and in Butler County, Kansas, but it is rather rare.

Ophioglossum engelmanni is one of the most common plants of the region. It is especially abundant in thin limestone soils, but also was noted frequently on shale and sandstone soils.

Along the Arkansas River in both Osage and Pawnee counties *Cheilanthes tomentosa* was found in large patches on dry sandstone cliffs. It was not found in similar situations farther north.

Camplosorus rhizophyllus was found in three places on moist sandstone cliffs and one large colony of *Poly-*